

# Lower Middle Miocene Fan 1 Play

MM4 F1, #1981

*Gyroidina "K" through Amphistegina "B"*

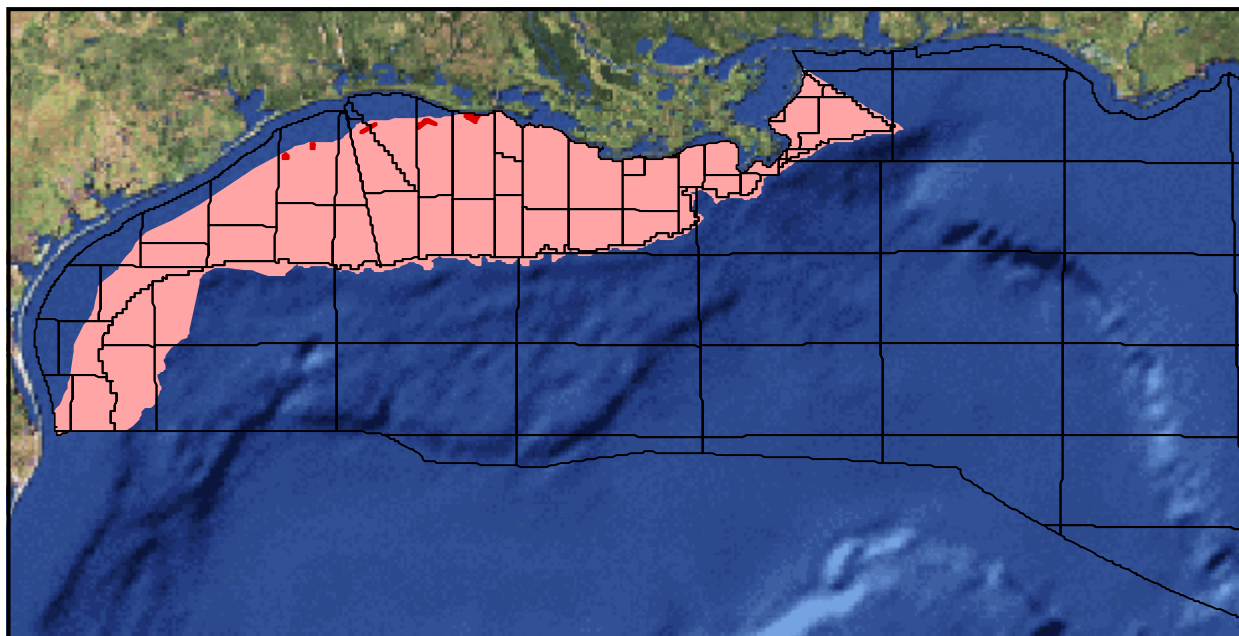


Figure 307. MM4 F1 map showing location of play. Play limit shown in light red; hydrocarbon limit shown in dark red.

## Overview

The Lower Middle Miocene Fan 1 Play (MM4 F1) contains reserves of 1,112.098 Bcfg and 31.345 MMbo (229.227 MMBOE) in 30 sands in 12 fields. The play extends continuously from the South Padre Island to Destin Dome Area ([Figure 307](#)).

## Description

MM4 F1 is defined by (1) a deep-sea fan depositional style representing sediments deposited basinward of the shelf edges associated with the MM4 Chronozone, (2) an extensional structural regime with salt-withdrawal basins and extensive listric, growth faulting rooting into salt detachments on the modern GOM shelf, and (3) the MM-1, MM-2, MM-3, and MM-4 Chronozones, the tops of which are defined by the *Gyroidina* "K", *Cristellaria* 54/*Eponides* 14, *Robulus* 43, and *Amphistegina* "B" biozones, respectively ([Figure 8](#)).

MM4 F1 extends continuously from the South Padre Island Area offshore Texas, along and updip from the modern GOM shelf edge to the west-central Destin Dome Area east of the modern Missis-

sippi River Delta ([Figure 307](#)). Hydrocarbons have been discovered in a very limited area of the play that includes the High Island to Vermilion Area.

Depositional systems included the North Padre Delta System in the southern Texas area and the Calcasieu Delta System along the Texas-Louisiana border (Galloway et al., 1986). Only those sands deposited by the Calcasieu Delta System have proven productive. This productive area occurs on the downthrown side of a regional growth fault system that parallels the modern coastline.

No significant lateral shift occurs from upper lower Miocene (LM4) deep-sea fan deposits to those of MM4 time. However, the shelf edge west of the Vermilion Area shows a significant basinward shift from LM4 to MM4 time, indicative of the prograding nature of the ancient delta systems.

## Play Limits

MM4 F1 extends onshore in an updip direction, except from the northern South Padre Island to northwestern Vermilion Area. Here, the play is limited by the MM-1 shelf edge, the farthest updip shelf edge associated with the MM4 Chronozone, and

grades into the sediments of the Lower Middle Miocene Progradational Play (MM4 P1). To the northeast, the play onlaps the lower Cretaceous carbonate slope. The play continues to the southwest into onshore Texas and Mexican national waters. Down dip, MM4 F1 is limited by the Lower Middle Miocene Fan 2 Play (MM4 F2) (Lore et al., 2001).

## Depositional Style

MM4 F1 is characterized by deep-sea fan systems deposited basinward of the MM-1 shelf edge. Component facies include channel/levee complexes, sheet-sand lobes, interlobe/fringe sediments, and slump sediments that were deposited on the MM-1 through MM-4 upper and lower slopes, in topographically low areas between salt structure highs, and abyssal plains. These deep-sea fan systems are often overlain by thick shale intervals representative of zones of sand bypass on the shelf, or sand-poor zones on the slope.

The thickest MM4 F1 section penetrated is about 4,500 ft. However, the entire MM4 F1 section has been penetrated by relatively few wells, so the section may actually be much thicker. Thick, upward-coarsening and upward-fining log patterns of sand-dominated intervals represent sheet-sand lobe progradation and channel fill/abandonment, respectively, in proximal-fan areas. Irregularly stratified sand successions displaying spiky log patterns suggest deposition in distal-fan areas.

## Structural Style

Normal faults dominate the MM4 F1 structural style. Anticlinal structures also occur, but much less frequently.

## Quantitative Attributes

On the basis of reserves calculations, MM4 F1 contains 86% gas and 14% oil. The 30 sands in the

	No. of Sands	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)
Proved	30	31.345	1,112.098	229.227
Cum. production	29	27.262	993.547	204.050
Remaining proved	15	4.083	118.551	25.178
Unproved	0	0.000	0.000	0.000

Table 147. MM4 F1 reserves and cumulative production.

play comprise 33 reservoirs, of which 32 are nonassociated gas and 1 is undersaturated oil. All reserves are proved and estimated to be 1,112.098 Bcfg and 31.345 MMbo (229.227 MMBOE) (Table 147). These reserves account for just over 11% of the reserves for the MM4 Chronozone.

Cumulative production from MM4 F1 totals 993.547 Bcfg and 27.262 MMbo (204.050 MMBOE) from 29 sands in all 12 fields in the play. This production accounts for 12% of the MM4 Chronozone's total production. Remaining proved reserves in the play are 118.551 Bcfg and 4.083 MMbo (25.178 MMBOE) in 15 sands in 10 fields.

Table 148 illustrates that water depths of the fields in MM4 F1 range from 25-53 ft, and play interval discovery depths vary from 10,125-18,000 ft, subsea. Additionally, porosity and water saturation range from 15-27% and 18-56%, respectively.

30 Sands	Min	Mean	Max
Water depth (ft)	25	39	53
Subsea depth (ft)	10,125	14,589	18,000
Reservoirs per sand	1	1	2
Porosity	15%	22%	27%
Water saturation	18%	28%	56%

Table 148. MM4 F1 sand attributes. Values are volume-weighted averages of individual reservoir attributes.

## Exploration History

MM4 F1 has a 44-year history of discoveries (Figure 308). The first sand in the play was discovered in 1955 in the East Cameron 49 Field. The maximum number of sands discovered in any year occurred in 1982 with 9 sands from two fields. How-

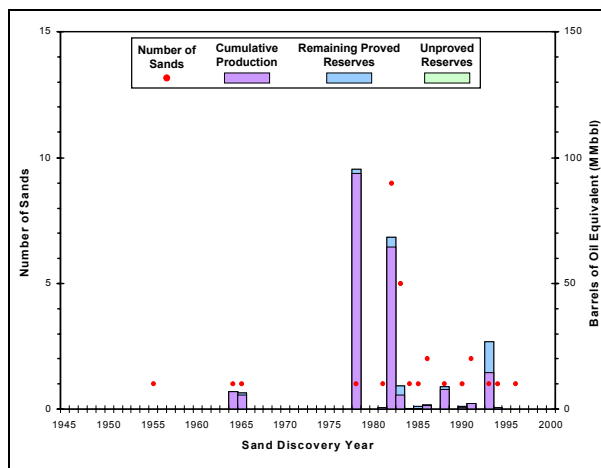


Figure 308. MM4 F1 exploration history graph showing reserves and number of sands discovered by year.

ever, the maximum yearly reserves of 95.463 MMBOE were added in 1978 with the discovery of the largest sand in the play in the Vermilion 14 Field (Figure 308). No other sand containing more than 50 MMBOE has been discovered.

Sand discoveries peaked in the 1980's at 20 (Figure 309). However, the first 4 sand discoveries in MM4 F1 occurred prior to the 1980's and account for almost 50% of the play's reserves. The mean sand size for the play is 7.641 MMBOE. One sand, containing estimated reserves of 0.012 MMBOE, has been discovered since the first Atlas database cutoff of January 1, 1995.

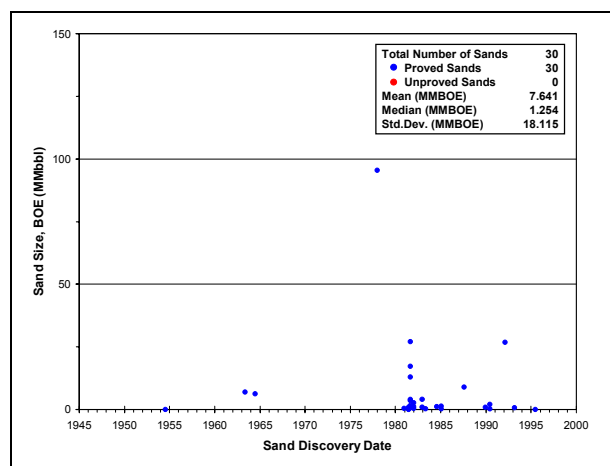


Figure 309. MM4 F1 sand discovery graph showing the size of sands discovered by year.

## Production History

MM4 F1 has a 36-year history of production (Figure 310). Production began in 1958, but ceased from 1960 to 1964, when the play was depleted in the only producing field at that time, East Cameron 49. Production began again in 1965 and reached a high in 1968, before beginning a decline that lasted through most of the 1970's. The early 1980 peak production years in the play coincided with the peak production from the large MM4 F1 sand in the Vermilion 14 Field. MM4 F1 production continued at a lower, but somewhat consistent level until 1995, when it began a steady decline. Both oil and gas production for 1998 were about 20% of the levels reached prior to 1995.

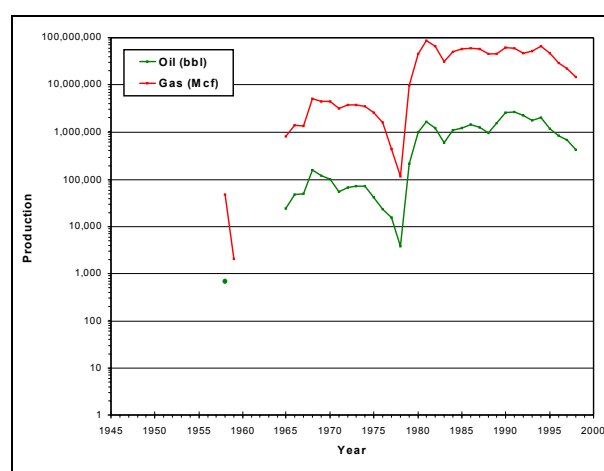


Figure 310. MM4 F1 production graph showing oil and gas production by year.